TEST REPORT

IP66 and IPX7 test of Tracy and Gracy LED panel

LED iBond A/S

Report no.: 122-28175-1

1 appendix

TEST Reg. no. 19

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OVERVIEW

Title	IP66 and IPX7 test of Tracy and Gracy LED panel
Test object	3 pcs. Tracy panel, Part no. 51563.060 3 pcs. Gracy panel, Part no. 51565 Detailed information is to be found in Section 2 The test objects were received 24 November 2022
Task no.	122-28175
Report no.	122-28175-1
Test period	24 November 2022 - 14 December 2022
Client	LED iBond A/S Agern Allé 5A 2970 Hørsholm DENMARK Tel.: +45 70 70 78 55
Contact person	Ryan Rosenberg rro@ledibond.com Tel.: +45 22 90 19 03
Manufacturer	LED iBond A/S
Specifications	IEC 60529:2013 Edition 2.2 "Degrees of protection provided by enclosures (IP Code)"
Results	See Section 1, Summary of test and Section 4, results.
Revisions	Initial version
Test site	Venlighedsvej 4, 2970 Hørsholm, Denmark
Test personnel	Jens Schoustrup-Thomsen Kristian Kolbye Jensen

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Appendix 1 List of instruments **36**

1 Summary of test

1.1 Test requirements

The following tests were carried out as agreed with the client.

Test	Test method
Dust protection, IP6X	IEC 60529:2013
Enclosure protection, IPX6	IEC 60529:2013
Enclosure protection, IPX7	IEC 60529:2013

The test results relate only to the objects tested.

1.2 Introduction

Tightness tests have been performed on 3 pcs. Tracy LED panel and 3 pcs. Gracy LED panel in order to evaluate the degree of protection against dust and water provided by the enclosures.

One Tracy LED Panel and one Gracy LED panel were tested for ingress of dust according to IEC 60529:2013 Edition 2.2, IP6X. The test was performed as Category 1. For detailed results, See Section 4.1.

The Tracy and Gracy LED panels were tested for penetration according to IEC 60529:2013 Edition 2.2, IP6X. The test wire of 1.0 mm is pushed against or inserted through any openings of the enclosure with the specified force. For detailed results, See Section 4.1.

One Tracy LED panel and one Gracy LED panel were tested for ingress of water according to IEC 60529:2013 Edition 2.2, IPX6. For detailed results, See Section 4.2.

One Tracy LED Panel and one Gracy LED panel were tested for ingress of water according to IEC 60529:2013 Edition 2.2, IPX7. For detailed results, See Section 4.3.

The test results relate to the tested objects only.

The test objects were not energised during exposures. However, a functional test was performed before and after the exposure.

1.3 Conclusion

The visual inspection performed after the IP6X test revealed no dust inside the enclosure of the Tracy LED panel. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.1.

The probe could not enter the enclosure of the Tracy LED panels, and clearance was kept to any hazardous parts. For detailed results, See Section 4.1.

The visual inspection performed after the IP6X test revealed no dust inside the enclosure of the Gracy LED panel. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.2.

The probe could not enter the enclosure of the Gracy LED panels, and clearance was kept to any hazardous parts. For detailed results, See Section 4.2.

The visual inspection performed after the IPX6 test revealed no water inside the enclosure of the Tracy LED panel enclosures. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.3.

The visual inspection performed after the IPX6 test revealed water inside one of the LEDs of the Gracy LED panel. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.4.

The visual inspection performed after the IPX7 test revealed no water inside the main enclosure of the Tracy LED panel enclosures. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.5.

The visual inspection performed after the IPX7 test revealed water inside some of the LEDs of the Gracy LED panel. Furthermore, the LEDs were able to light up before and immediately after exposure. For detailed results, See Section 4.6.

2 Test objects

2.1 Test object

Name of test object	Industrial LED Panel
Model / type	Tracy
Part no.	51563.060
Serial no's.	IP6X: 2247-022233 (Marked DUT1)
	IPX6: 2247-022226 (Marked DUT2)
	IPX7: 2247-022228 (Marked DUT3)
Manufacturer	LED iBond A/S
Supply voltage	24 V_{dc}

Photo 1 Test object.

2.1.1 Test object

Name of test object	Industrial LED Panel
Model / type	Gracy/Horticulture
Part no.	51565
Serial no.	IP6X: N/A Marked DUT4
	IPX6: N/A Marked DUT5
	IPX7: N/A Marked DUT6
Manufacturer	LED iBond A/S
Supply voltage	24 V_{DC}
Comments	DUT4 shown. DUT5 and DUT6 are identical.

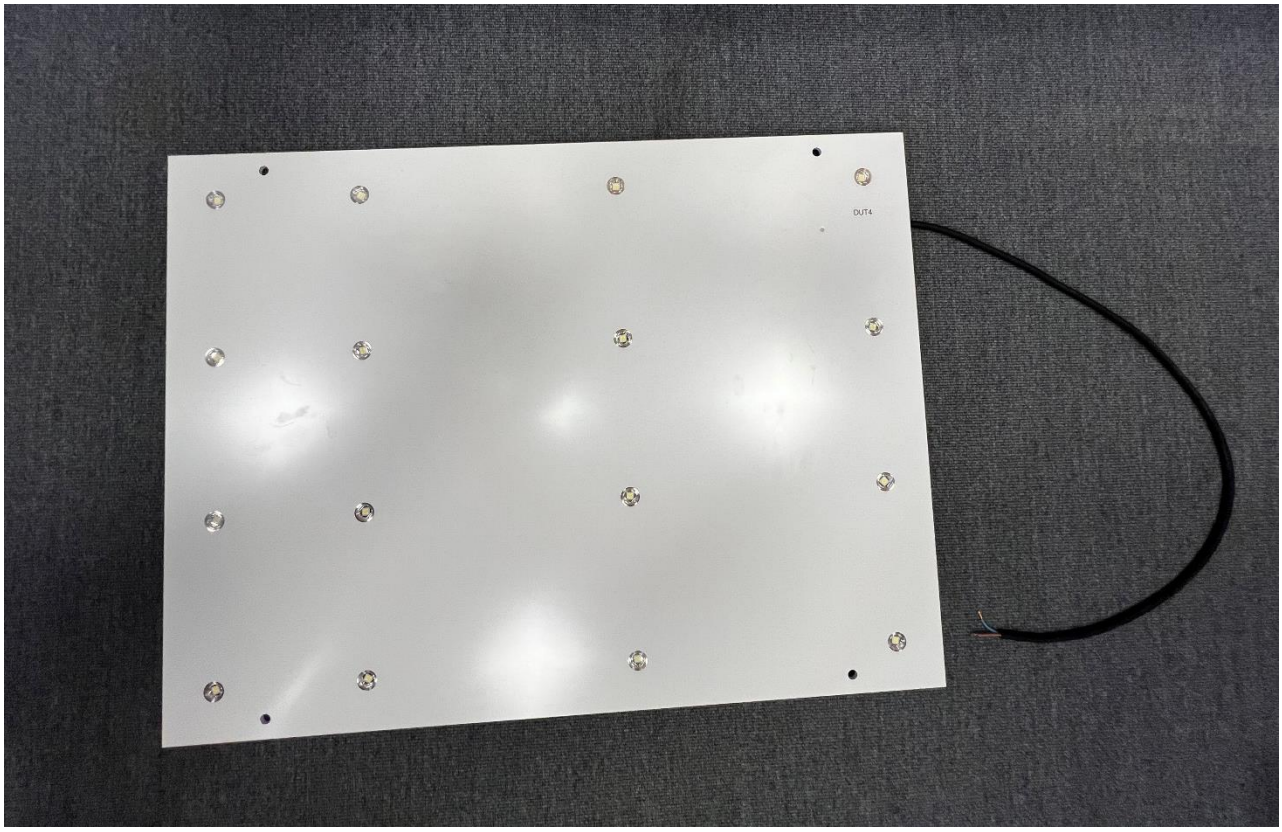

Photo 2 Test object.

2.2 Auxiliary equipment

2.2.1 Auxiliary equipment

Name of auxiliary equipment	Electronic Converter for LED
Model / type	ECXd 1050.299
Serial no.	186763
Manufacturer	Vossloh-Schwabe Deutschland GmbH
Supply voltage	In: 220 – 240 V
	Out: 10 – 54 V, 38 W
Comments	Converted used to functional test all LED panels.

3 General test conditions

3.1 Test setup

Photos of the test setup is enclosed in Section 4.

3.2 Functional test

A functional test was performed before and after each test. The functional test was carried out in accordance with the functional test procedure provided by the client.

3.3 Visual inspection

A visual inspection was carried out by FORCE Technology after each test. The inspection included opening the test object and looking for ingress of dust and water.

3.4 Standard environment

Normal environmental condition:

Temperature	:	15 °C - 35 °C
Humidity	:	25 %rh - 75 %rh
Air pressure	:	86 kPa - 106 kPa (860 mbar - 1060 mbar)
Power supply voltage	:	U_{nom}. ±3 %

4 Test and results

4.1 Dust protection, IP6X (Tracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IP6X (dust-tight):

Category	:	1 (air pressure reduction)
Dust medium	:	Talcum
Air pressure	:	2 kPa (20 mbar) below normal air pressure
Duration	:	8 h

Procedure

The test object is de-energised during the exposure.

The test object is placed inside the dust test chamber in an upright position as would be expected during normal use. Hereafter, it is exposed to swirling dust conditions as described in the reference specification.

After the exposure, the test object is brushed down on all external surfaces. It is then carefully opened and visually inspected for ingress of dust. Special attention is paid to dust accumulated on parts critical to the functionality of the test object.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for first characteristic number 6

The protection is satisfactory if, on inspection, no ingress of dust is observed.

Results

The test was performed as specified. A visual inspection showed that there was no ingress of dust inside the enclosure. Furthermore, an ø 1.0 mm test wire could not enter through any holes or openings, and adequate clearance was kept between the test wire and hazardous parts.

During the test, the suction nozzle was mounted on a representative LED.

The functional test performed after the exposure was OK.

Photo 3 Before exposure, IP6X.

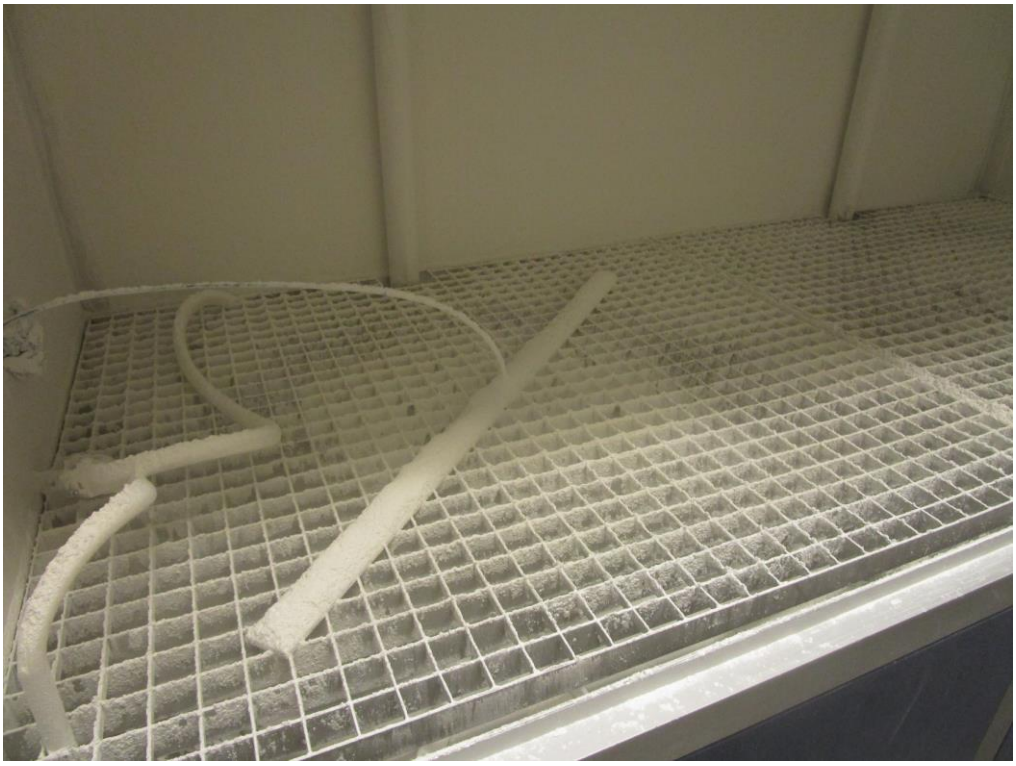

Photo 4 After exposure, IP6X.

Photo 5 Visual inspection. IP6X. No dust observed inside LED sockets.

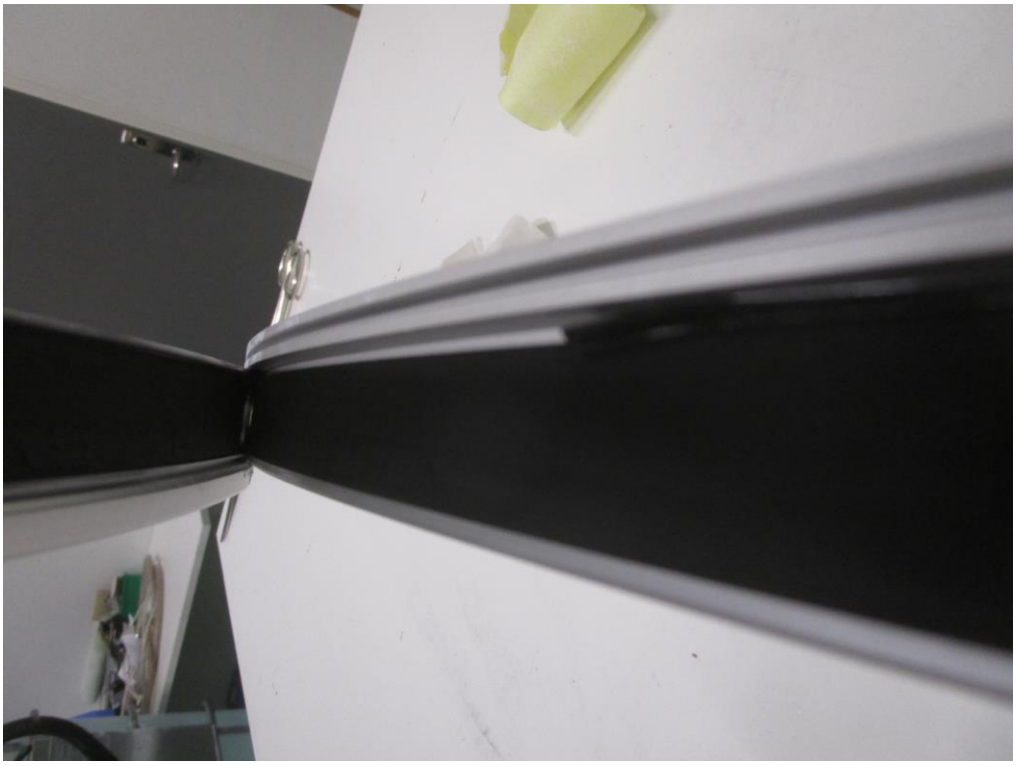

Photo 6 Visual inspection. IP6X. No dust observed inside main enclosure.

Photo 7 Visual inspection. IP6X. No dust observed inside main enclosure.

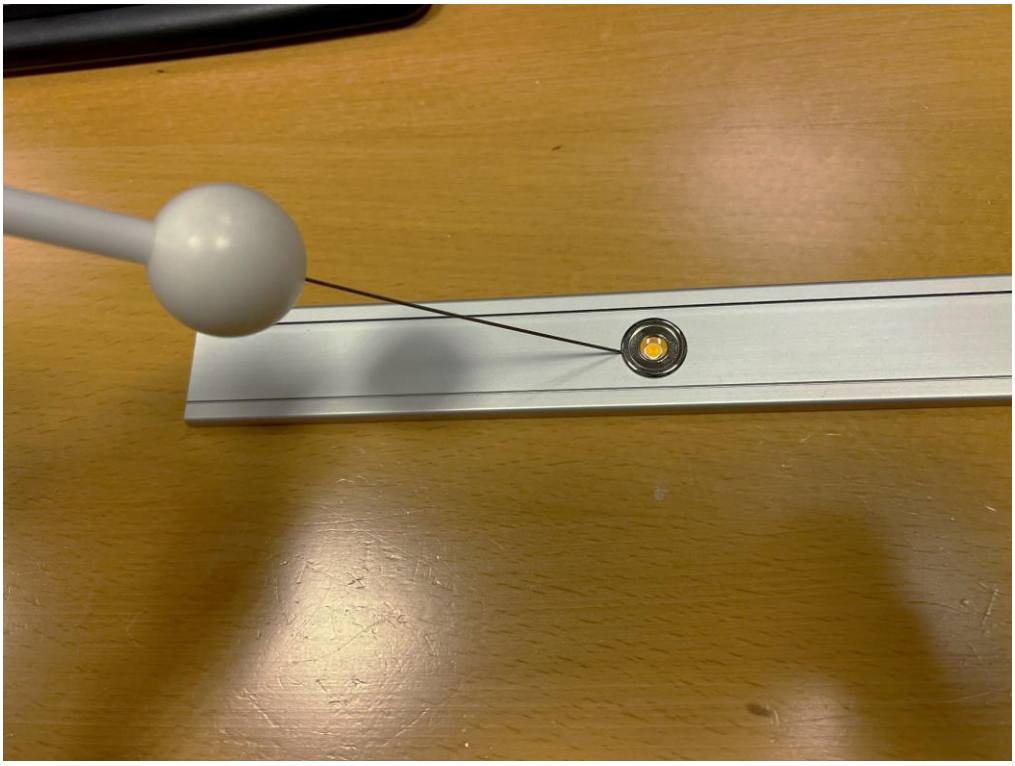

Photo 8 Enclosure protection. IP6X. 1 mm probe. Adequate clearance kept to any hazardous parts.

4.2 Dust protection, IP6X (Gracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IP6X (dust-tight):

Category	:	1 (air pressure reduction)
Dust medium	:	Talcum
Air pressure	:	2 kPa (20 mbar) below normal air pressure
Duration	:	8 h

Procedure

The test object is de-energised during the exposure.

The test object is placed inside the dust test chamber in an upright position as would be expected during normal use. Hereafter, it is exposed to swirling dust conditions as described in the reference specification.

After the exposure, the test object is brushed down on all external surfaces. It is then carefully opened and visually inspected for ingress of dust. Special attention is paid to dust accumulated on parts critical to the functionality of the test object.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for first characteristic number 6

The protection is satisfactory if, on inspection, no ingress of dust is observed.

Results

The test was performed as specified. A visual inspection showed that there was no ingress of dust inside the enclosure. Furthermore, an ø 1.0 mm test wire could not enter through any holes or openings, and adequate clearance was kept between the test wire and hazardous parts.

During the test, the suction nozzle was mounted on a representative LED.

The functional test performed after the exposure was OK.

Photo 9 Before exposure, IP6X.

Photo 10 After exposure, IP6X.

Photo 11 Visual inspection. IP6X. No dust observed inside LED sockets.

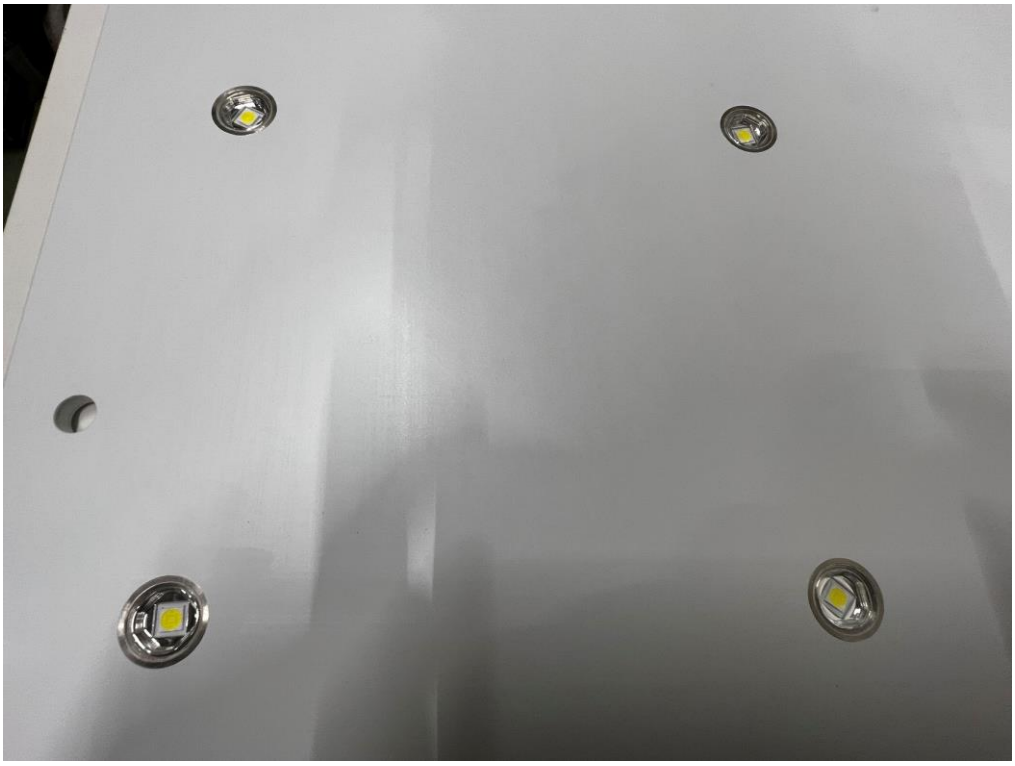

Photo 12 Visual inspection. IP6X. No dust observed inside LED sockets. Similar for all sockets.

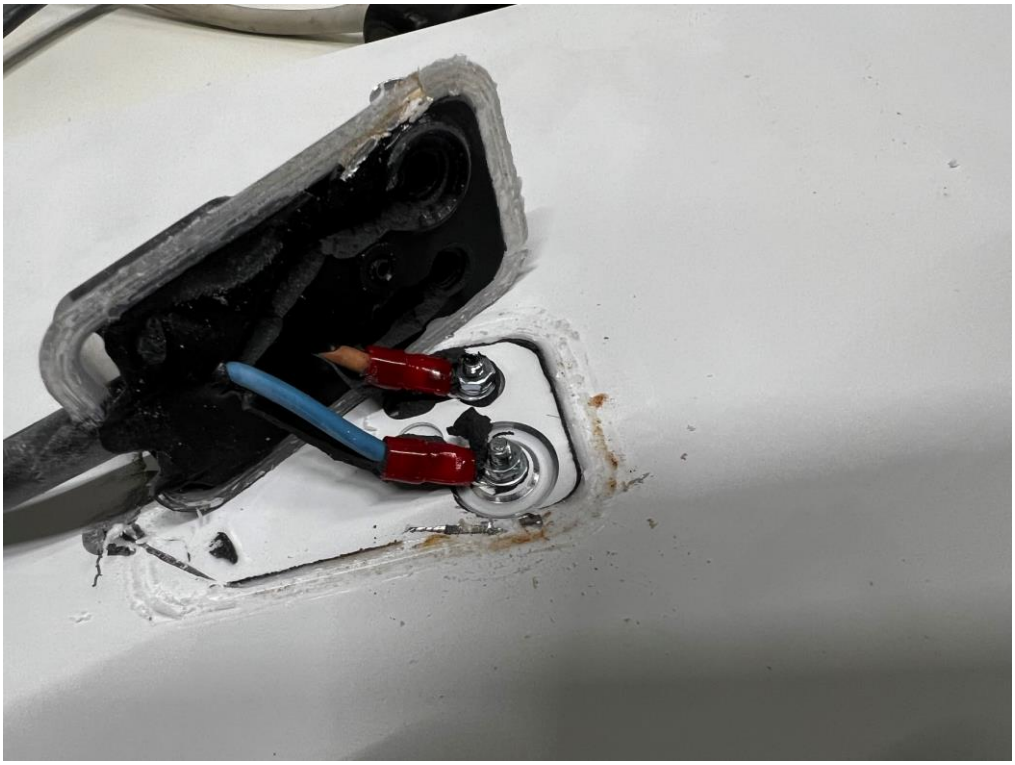

Photo 13 Visual inspection. IP6X. No dust observed inside power connection.

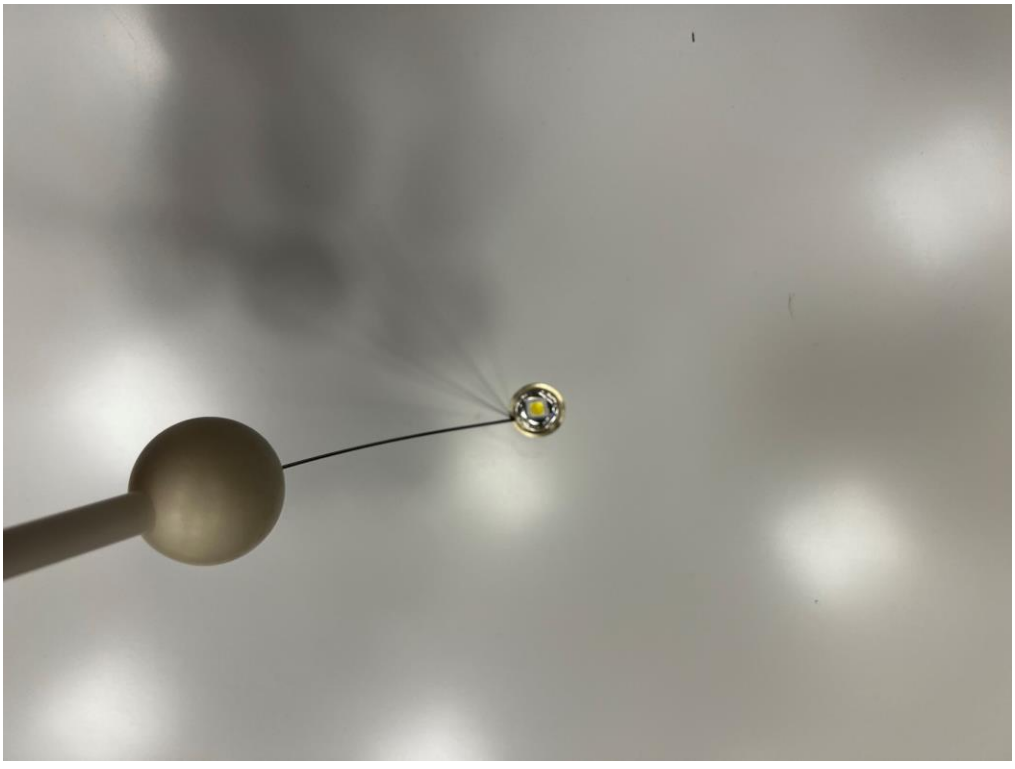

Photo 14 Enclosure protection. IP6X. 1 mm probe. Adequate clearance kept to any hazardous parts.

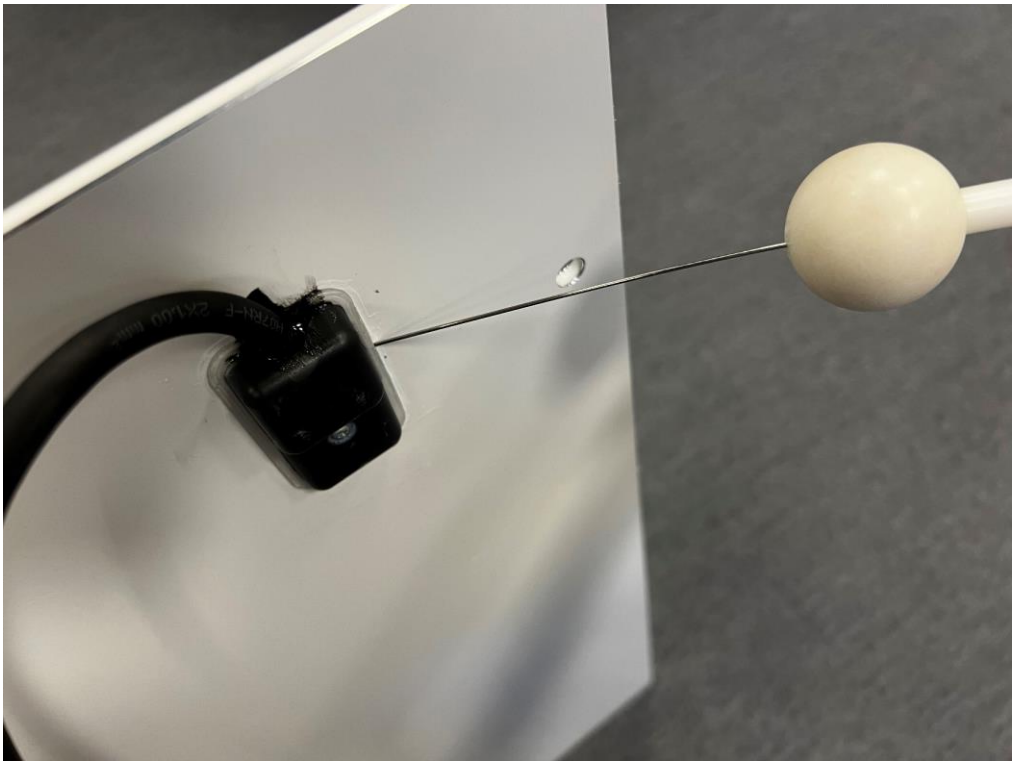

Photo 15 Enclosure protection. IP6X. 1 mm probe. Adequate clearance kept to any hazardous parts.

4.3 Enclosure protection, IPX6 (Tracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IPX6 (Protection against water jets from all directions):

Internal diameter of the nozzle	:	12.5 mm
Intensity	:	100 l/min
Test duration	:	1 min per m^2, 3 min minimum
Distance from nozzle to object	:	2.5 to 3 m

Procedure

The test object is de-energised during the exposure.

The test object is subjected to the specified flow of water for the specified duration from all practical directions.

After the test, the test object is wiped off on all external surfaces, and an internal visual inspection is performed.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for second characteristic number 6

In general, if any water has entered it shall not be sufficient to interfere with the correct operation of the equipment or impair safety.

Results

The test was performed as specified. The visual inspection showed no ingress of water inside the test object.

The functional test performed after the exposure was OK.

Photo 16 During exposure, IPX6.

Photo 17 Visual inspection, IPX6. No ingress of water observed behind any of the LEDs.

Photo 18 Visual inspection, IPX6. No ingress of water observed inside enclosure.

Photo 19 Visual inspection, IPX6. No ingress of water observed inside enclosure.

Photo 20 Visual inspection, IPX6. No ingress of water observed inside enclosure.

4.4 Enclosure protection, IPX6 (Gracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IPX6 (Protection against water jets from all directions):

Internal diameter of the nozzle	:	12.5 mm
Intensity	:	100 l/min
Test duration	:	1 min per m^2, 3 min minimum
Distance from nozzle to object	:	2.5 to 3 m

Procedure

The test object is de-energised during the exposure.

The test object is subjected to the specified flow of water for the specified duration from all practical directions.

After the test, the test object is wiped off on all external surfaces, and an internal visual inspection is performed.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for second characteristic number 6

In general, if any water has entered it shall not be sufficient to interfere with the correct operation of the equipment or impair safety.

Results

The test was performed as specified. The visual inspection showed ingress of water inside the test object. Ingress of water was observed on the inside of one of the LEDs. The remaining 15 had no ingress of water.

The functional test performed after the exposure was OK.

Photo 21 During exposure, IPX6.

Photo 22 Visual inspection, IPX6. Ingress of water observed inside one of the LEDs.

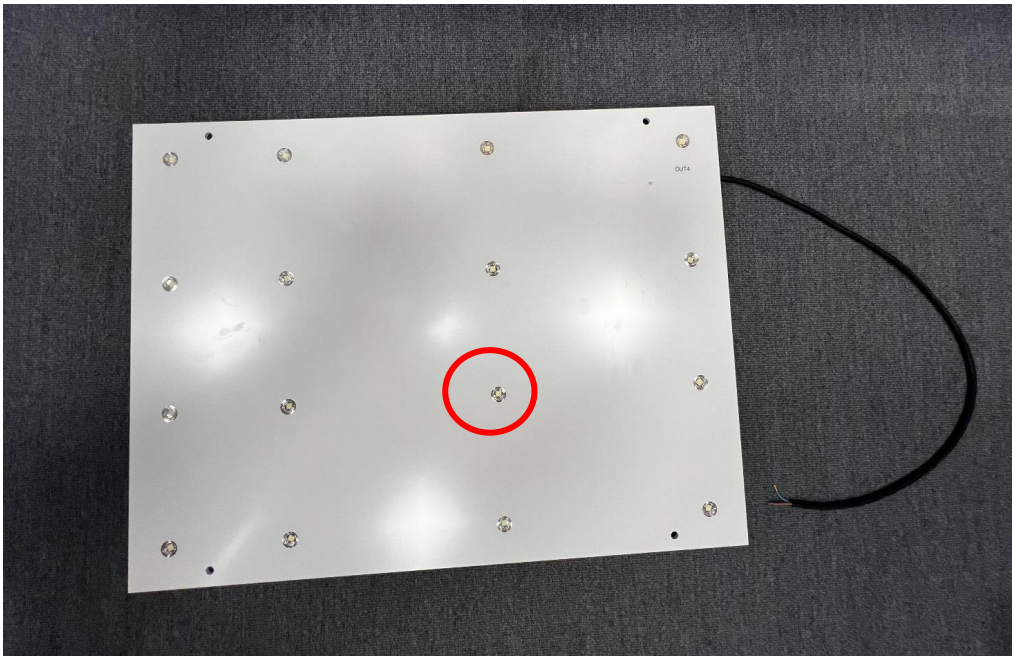

Photo 23 Visual inspection, IPX6. Ingress of water observed inside 1 LED socket, marked by red circle.

Photo 24 Visual inspection, IPX6. Ingress of water observed inside one of the LEDs

Photo 25 Visual inspection, IPX6. No ingress of water observed inside power connection.

4.5 Enclosure protection, IPX7 (Tracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IPX7 (Protection against immersion):

Immersiondepth	:	1000 mm
Duration	:	30 min

Procedure

The test object is de-energised during the exposure.

The test object is immersed in water for the specified duration.

After the test, the test object is wiped off on all external surfaces, and an internal visual inspection is performed.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for second characteristic number 7

In general, if any water has entered it shall not be sufficient to interfere with the correct operation of the equipment or impair safety.

Results

The test was performed as specified. The visual inspection showed no ingress of water inside the test object.

The functional test performed after the exposure was OK.

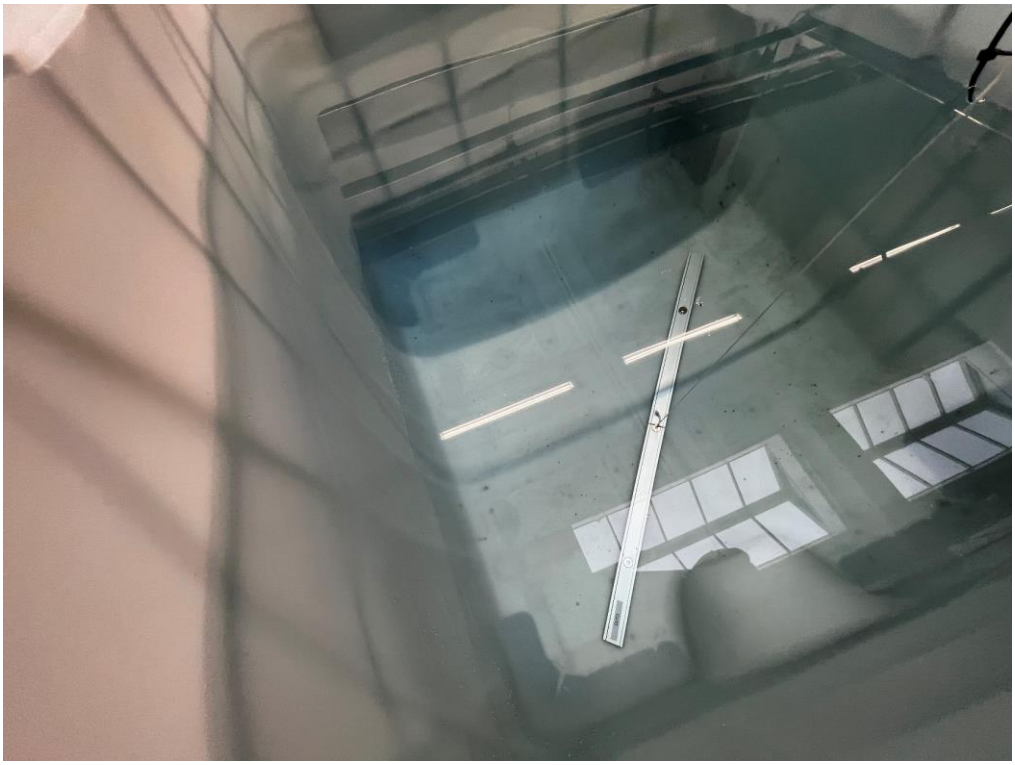

Photo 26 During exposure, IPX7.

Photo 27 Visual inspection, IPX7. No ingress of water observed inside LED socket. Similar for all LED sockets.

Photo 28 Visual inspection, IPX7. No ingress of water observed inside main enclosure.

Photo 29 Visual inspection, IPX7. No ingress of water observed inside main enclosure.

4.6 Enclosure protection, IPX7 (Gracy LED panel)

Test specification and Test method

IEC 60529:2013 Degrees of protection provided by enclosures (IP Code).

Severity

IPX7 (Protection against immersion):

Immersiondepth	:	1000 mm
Duration	:	30 min

Procedure

The test object is de-energised during the exposure.

The test object is immersed in water for the specified duration.

After the test, the test object is wiped off on all external surfaces, and an internal visual inspection is performed.

After the exposure the test object is energized, and a functional test is performed.

Acceptance condition for second characteristic number 7

In general, if any water has entered it shall not be sufficient to interfere with the correct operation of the equipment or impair safety.

Results

The test was performed as specified. The visual inspection showed ingress of water inside the test object.

The functional test performed after the exposure was OK.

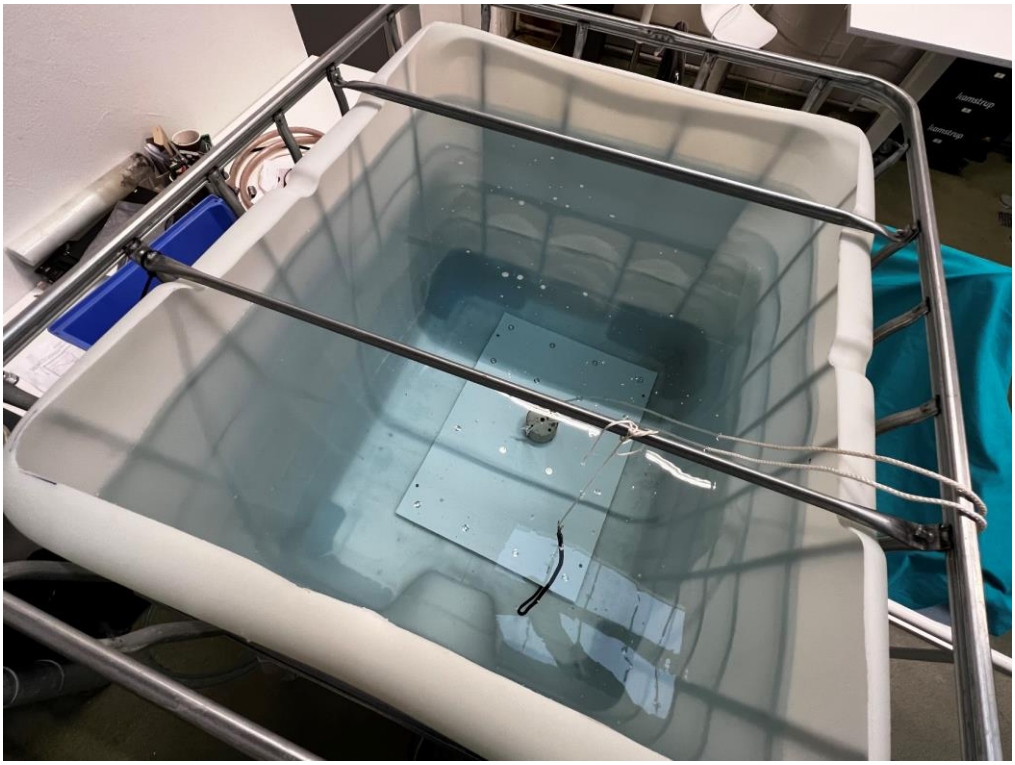

Photo 30 During exposure, IPX7.

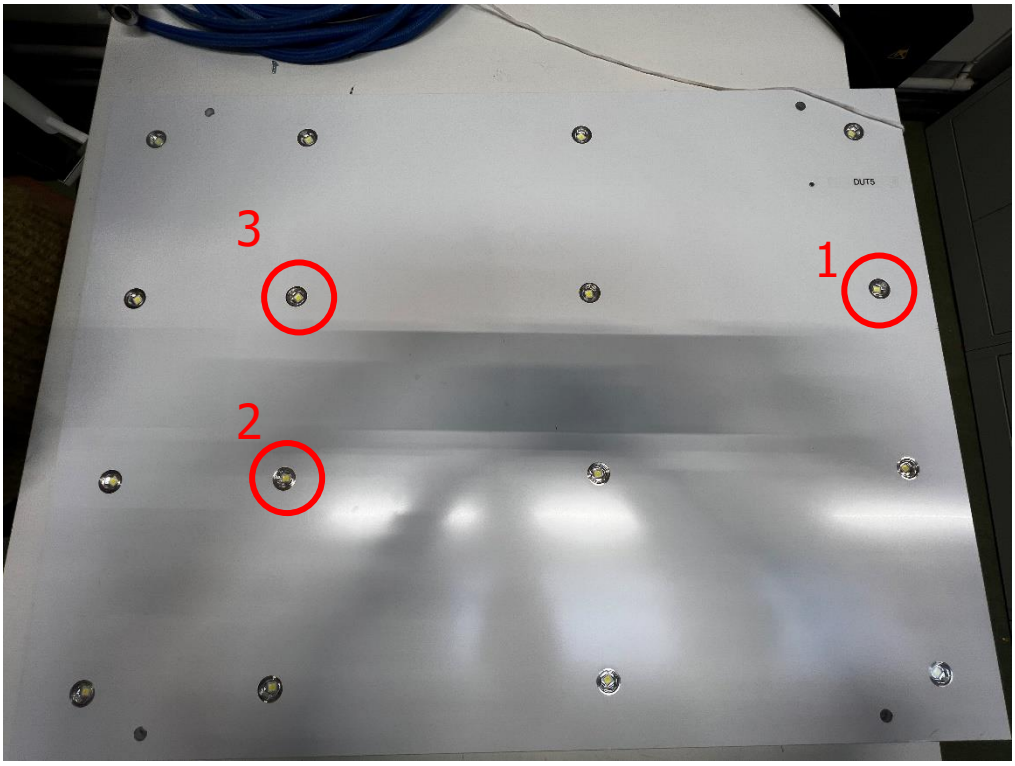

Photo 31 Visual inspection, IPX7. Ingress of water observed inside 3 LED sockets, marked by red circle and numbered.

Photo 32 Visual inspection, IPX7. Ingres of water observed inside LED socket (numbered 1 on overview photo).

Photo 33 Visual inspection, IPX7. Ingres of water observed inside LED socket (numbered 1 on overview photo) – Lid removed. Similar when opening the sockets shown on photo 34 and 35.

Photo 34 Visual inspection, IPX7. Ingres of water observed inside LED socket (numbered 2 on overview photo).

Photo 35 Visual inspection, IPX7. Ingres of water observed inside LED socket (numbered 3 on overview photo).

Photo 36 Visual inspection, IPX7. No Ingres of water observed inside power connection.

APPENDIX

Appendix 1 List of instruments

NO.	DESCRIPTION	MANUFACTURER	TYPE NO.
43327	Humidity and temperature logger	ELMA Instruments	DT172
43281	Temperature	Elma Instruments	711
43305	Stopwatch	RS PRP	811814
43301	Measuring tape	Stanley	5m/30-696
EVFGT-49	IP Dust chamber	Weiss	ST2000
43239	IP Probe test kit	ED&D	A,B,C,D,E,F,G
43280	Flowmeter	Eberhardt/IOSIL	MS 501-T20-1A1A1A
43298	Leakage tester	Wöhler	LT600